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Spiteri-Cornish, L & Moraes, C

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The Impact of Consumer Confusion on Nutrition Literacy and Subsequent Dietary Behavior

Dr Lara Spiteri Cornish and Dr Caroline Moraes
(Coventry University)

Dr Lara Spiteri Cornish**
Senior Lecturer in Marketing and Advertising
Faculty of Business, Environment & Society
Coventry University
Priory Street
Coventry, UK
CV1 5FB
Tel: +44 (0) 24 77659456
Email: l.cornish@coventry.ac.uk

Dr Caroline Moraes
Reader in Marketing, Centre for Business in Society (CBiS)
Faculty of Business, Environment & Society
Coventry University
Priory Street
Coventry, UK
CV1 5FB
Tel: +44 (0) 75 5742 5591
Email: caroline.moraes@coventry.ac.uk

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The Impact of Consumer Confusion on Nutrition Literacy and Subsequent Dietary Behavior

Abstract

This paper examines the impact of consumer confusion on nutrition knowledge, literacy, and dietary behavior. While previous research largely focuses on understanding why consumers might not respond to healthy eating communications, this paper seeks to uncover the various behavioral responses to such campaigns, particularly those that contravene health communication objectives. Using an interpretive methodology, findings suggest that most participants do respond to health communications by striving to eat healthily, but inadequate nutrition information derived from unreliable sources, flawed baseline nutrition knowledge, and poor nutrition literacy hinder participants' efforts. Inconsistent, incomplete, and contradictory information leaves many participants feeling confused about how to implement healthy eating habits. Further, a lack of ability to differentiate between credible and unreliable sources of nutrition information means that many participants blame their confusion on policy-makers, and express frustration and cynicism towards vague and often contradictory communications. This, in turn, increases participants' reliance on food adverts, product labels, and other commercial sources of ambiguous yet appealing information. The paper's theoretical contribution includes a consumer confusion framework for healthy eating, and policy implications highlight that health campaigns seeking to increase consumer awareness of healthy eating are not enough. Policy-makers must become the most credible sources of information about healthy eating, and distinguish themselves from competing and unreliable sources of nutrition information.

Keywords: Nutrition Knowledge; Nutrition Literacy; Consumer Confusion.

The Impact of Consumer Confusion on Nutrition Literacy and Subsequent Dietary Behavior

The aim of this research is to explore whether consumer confusion regarding healthy eating and nutrition information has a negative impact on nutrition knowledge and literacy, as well as on dietary behaviors. Healthy eating can be defined as the eating behaviors that enable a person to achieve “a state of complete physical, mental, and social wellbeing, and not merely the absence of disease or infirmity” (World Health Organization [WHO], 2007). The best health outcomes are associated with balanced dietary patterns that boast high intakes of fruits, vegetables and grains, not just eating or avoiding a single food (Nestle, 2007; Wansink, 2007). Nutrition literacy is essential to healthy eating: it can be seen as the end result of many pushes and pulls, and a response to multiple forces that create an overall nutrition environment (Blaylock, Smallwood, Kassel, Variyam & Aldrich, 1999). One such pull is the rise of healthy eating communications, and social marketing campaigns devised by policy-makers who seek to encourage healthier dietary habits among consumers. Indeed, the dramatic rise in obesity over the past decade (Finkelstein et al., 2012; Stevens et al., 2012) has prompted academic discourse to assist the development of interventional public policies (Andreasen, 2011), along with a number of healthy eating campaigns (e.g. “Eat4Life” and “5-a-day Campaign” in the UK). This pull, in turn, has resulted in a push response by the food industry in the form of brand new foods marketed as healthier or healthy (Kleinschmidt, 2003; Lahteenmaki, 2003; Menrad, 2003; Wansink, 2007), in order to convey a better fit with the new healthy eating paradigm, without necessarily being healthier than the alternatives. Such push has also meant new ideas and concepts about healthy eating and healthy foods (Block et al., 2011; Nestle, 2007; Pollan, 2009).

This push-pull dynamic has caused increased consumer awareness of the importance of eating healthily (Department of Health, 2009). However, it has also created much scope for

consumer confusion. In fact, despite increased consumer awareness of the need to eat healthily, dietary patterns have not improved. In the US, for example, the Produce for Better Health Foundation (2009) found that fruit and vegetable consumption dropped by 12% and 6% respectively, when compared to the previous year. In Europe, the WHO estimates that in more than half of European countries the individual consumption of fruits and vegetables is lower than 400g per day, and in one third of such countries the average individual intake is less than 300g per day (European Food Information Council [EUFIC], 2012). The European Food Safety Authority's analysis based on national dietary surveys suggests that the recommended amount is reached only in four of the participating eleven EU Member States (EUFIC, 2012). In the UK, there is a significant upward trend in household expenditure on eggs, butter, beverages, sugar, and preserves (The National Health Service [NHS] Information Centre, 2012), yet purchases of fruits and vegetables are now respectively 11.6% and 9.6% lower than in 2007 (The NHS Information Centre, 2012).

Concerns about unhealthy dietary patterns have led to a growing literature in consumer behavior related to the impact of food communication on food consumption (Fitzgibbon et al., 2007; Hornik & Kelly, 2007; Randolph & Viswanath, 2004; Snyder, 2007; Verbeke, 2008). In this literature, a number of negative psychological consequences of healthy eating communications that might lead to resistance to comply with desirable nutrition behaviors were identified (e.g. denial, excess fear), and recommendations were made with regard to how campaigns can be modified to result in increased uptake of desired behaviors (Grier & Bryant, 2005; Hastings, Stead & Mead, 2004; Peattie & Peattie, 2009).

The implicit assumption of this literature is that the high level of consumer awareness regarding healthy eating communications, combined with the lack of positive change in healthy eating, means that these messages are failing to persuade consumers to implement the compliant

dietary behavior (Evans & Hastings, 2009; Guttman & Salmon, 2004; Hornik, 2002). However, this may not be an issue of poor communicative persuasion, which is a research problem we seek to address by answering the following question: is consumer confusion regarding nutrition information affecting nutrition knowledge and literacy, and what are the impacts of poor nutrition literacy on consumer perceptions of healthy foods, and consequent dietary behaviors?

In order to address this research question, we draw on the consumer confusion literature (Mitchell et al., 2005; Mitchell & Papavassiliou 1999), and argue, as do Block et al. (2011), that having nutrition knowledge is not sufficient to change consumers' food consumption. Consumers need appropriate nutrition literacy, which goes beyond having healthy eating knowledge; it encompasses having correct information (i.e. legitimate knowledge), the ability to understand such information (i.e. nutrition self-efficacy), as well as the opportunity, and motivation, to use such nutrition knowledge to make healthy food choices that lead to overall healthy diets (Block et al., 2011).

Indeed, an alternative explanation as to why consumers are failing to implement healthy dietary behaviors could be that consumers *do* respond to healthy eating communications, but they do so from their level of nutrition understanding. Consumers may be confused due to limited or flawed nutrition knowledge acquired from sources that lack proper expertise in nutrition or that, alternatively, have commercial rather than health-related objectives. An example of such flawed nutrition knowledge includes the belief that low-fat foods are healthier than high-fat alternatives, which is flawed because foods with reduced fat content often have high sugar and salt content. This, in turn, results in poor nutrition literacy, and the implementation of dietary changes that contravene the intentions of health messages. This proposition is the main contribution of this paper. It offers a new perspective on the impact of healthy eating communications and food consumption, and leads to significant implications for

nutrition researchers, policy-makers, and marketing managers, at a time when healthy eating is high on the policy-making agenda (Scammon et al., 2011). The important albeit under-researched role of nutrition knowledge in nutrition literacy, food choice, and consumption has led to a call from researchers to further investigate associations between this type of knowledge, and food consumption (Block et al., 2011; Wardle, Parmenter & Waller, 2000; Worsley, 2002). Thus, we address this literature gap. Implications include the need for relevant stakeholder groups to consider their various audiences' baseline nutrition knowledge when communicating healthy eating messages, and the need for policy-makers to consider competing, and potentially misleading nutrition information sources, which consumers might perceive as legitimate. Next, we present our literature review.

Literature Review

The Significance of Healthy Eating Communications

Healthy eating, and its impact on longevity, is an increasingly important concern in Western societies (Marks, Murray, Evans & Willig, 2000). This has led to a myriad of pull efforts in the form of health communications, and social marketing interventions designed to inform and capture the attention of consumers, as well as to motivate them to change unhealthy dietary behaviors (Prochaska & DiClemente, 1983; Randolph & Viswanath, 2004; Snyder, 2007). While UK healthy eating campaigns have successfully raised the target population's awareness of the importance of healthy eating (see Department of Health, 2009; Hawkes, 2013), they have had little impact on changing what consumers actually eat (Dubé & Cantin, 2000; Young, 2002). While people may be aware of nutritional information and advice, this knowledge is rarely put into practice (Croll, Nuemark-Sztainer & Story, 2001; Young, 2002).

One element of healthy eating communications that has a strong influence on its effectiveness is the clarity of the message, including the specificity of its recommendations (Henley, Donovan & Moorhead, 1998). Unlike other health scenarios where one recommendation (e.g. stop smoking) forms the foundation of all campaign messages, healthy eating messages are more complex for a number of reasons. First, there is “no genuine agreement about which dietary strategies are most effective” (Hornik & Kelly, 2007, p. 7). Some policy messages can sometimes be poorly targeted and contradictory, as different research offers different results about the same nutrition issue. This is the case with the impact of fiber consumption on colon cancer (Hornik & Kelly, 2007), for example. Second, although fear appeals used in such communications can often help capture consumer attention in cluttered media environments, they can also lead consumers to avoid processing relevant health information, and to develop negative attitudes and negative intentions toward the desired health behavior (Cho & Salmon, 2006). Third, certain communication strategies create even more problems because of their ambiguity. For instance, health messages that discourage the consumption of saturated fat can be problematic because some of this type of fat is necessary for healthy brain function (US Department of Health and Agricultural Services & Department of Agriculture, 2005). Finally, many healthy eating campaigns are not specific or clear enough regarding the recommendations they propose to consumers, which are likely to significantly reduce their impact (Beaudoin, Fernandez, Wall & Farley, 2007; Snyder, 2007).

Fitzgibbon et al. (2007, p. 65) suggest that behavioral change communications that fail to advocate a specific course of action, and offer general guidelines without practical “how to” and “when to” information, are likely to result in consumers feeling confused about how to change their behavior. This, in turn, may encourage consumers to look for nutrition information elsewhere (i.e. from illegitimate commercial sources). Food marketers spend millions of dollars

every year to develop marketing campaigns aimed at telling people about brand new healthy foods, and healthier alternatives to unhealthy foods (Nestle, 2007). With a burgeoning healthy food industry, consumers are constantly exposed to a myriad of push information from sources such as retailers and manufacturers about what foods are healthy, and what a healthy diet might look like. However, such information may be ambiguous or misleading, which in turn is likely to negatively impact consumers' nutrition knowledge (Grunert et al., 2012). For example, some cereal bars are advertised as healthy because of their fiber content, yet not only are many of these bars high in fat, sugar, salt, and calories, but the positive impact of the fiber obtained from such processed foods is disputed by nutritionists (Nestle 2007). Such ambiguous or misleading information may also encourage consumers to engage in flawed substitutive behavior. Substitutive behavior, that is, exchanging foods perceived to be detrimental to health for so-perceived healthy alternatives (Chakravorty, 1996; Ellison et al., 1990; Stok, de Vet, de Ridder, & de Wit, 2012; Strecher, 1986), can have a positive health effect. However, this will depend on what is substituted, and what is used as a substitute (Spiteri-Cornish, 2012; Wansink, 2007), as flawed nutrition information or misleading advice from non-expert sources can lead to unhealthy substitutions.

Finally, uncertainty and confusion about what constitutes healthy eating may lead consumers to adopt their own version of healthy eating based on their baseline nutrition knowledge, and their interpretation of nutrition information obtained from various sources.

Nutrition Information, Source Factors, and Baseline Nutrition Knowledge

Consumer knowledge has always had an important role in explaining consumer behavior (Klerck & Sweeny, 2007; Park, Mothersbaugh & Feick, 1994), so considering nutrition knowledge as a precursor to dietary behavior is essential. Indeed, "nutrition knowledge is a prerequisite for

processing nutrition-related information when making food choices” (Grunert et al., 2012, p. 166). As a construct, nutrition knowledge has not yet been clearly defined, but Sapp and Jensen (1997) found that measures of nutrition knowledge typically contain questions related to the ability to recall nutrient content of foods, and to understand the source and form of these nutrients. More recently, researchers have used or adapted Parmenter and Wardle’s (1999) nutrition knowledge scale, which includes understanding of nutrition terms, awareness of dietary recommendations, knowledge of foods as sources of nutrients, ability to apply information in choices, and awareness of diet-disease associations.

Many studies have reported a positive association between appropriate nutrition knowledge, and healthy dietary behavior (Dallongeville, Marécaux, Cottel, Bingham & Amouyel, 2001; Handu, Monty & Chmel, 2008; Klohe-Lehman et al., 2006; Lee, Lee, Chang & Kim, 2009). One of the most important findings is the link between adequate consumer understanding of food information (i.e. labelling and communications), and their nutrition knowledge. Most food products today contain nutritional information using a variety of labels, health symbols, nutrition claims, and other ways of communicating the nutritional properties of the food (Storcksdieck genannt Bonsmann et al., 2010). This plethora of information is positive in the sense that it seeks to help consumers make positive, healthy food choices. However, more information does not necessarily lead to better informed consumers; on the contrary, it can result in information overload, leading to consumer apathy, and lack of consumer confidence (Mitchell et al., 2005; Verbeke, 2005).

Previous research in consumer decision-making, attitude formation, and change (Eagly & Chaiken, 1993; Peter, Olson & Grunert, 1999; Solomon, Bamossy, Askegaard & Hogg, 2006) demonstrates that the impact of nutrition information is affected in the first instance by consumers’ baseline nutrition knowledge. It is this knowledge that is antecedent to the way in

which consumers use labelling and other information to make sense of the healthiness of products (Grunert & Wills, 2007; Grunert, Fernández-Celemín, Wills, Storcksdieck genannt Bonsmann & Nureeva, 2010; Grunert, Wills & Fernández-Celemín, 2010). This means that consumers need to be aware of appropriate nutrition information, recommendations, as well as essential food guidelines, if they are to make positive dietary choices. In fact, research demonstrates that awareness of, and interest in, healthy eating may not result in healthy choices if there is limited or flawed nutrition knowledge (Grunert et al., 2012). Thus, when considering the important role of baseline nutrition knowledge in dietary behavior, it is essential to understand where consumers get their nutrition information, and how this information affects the accuracy of their nutrition knowledge.

Many studies distinguish between two components of knowledge, namely subjective and objective knowledge. Subjective knowledge refers to consumers' *perceptions* regarding the amount of product information stored in their memory (Brucks, 1985; Flynn & Goldsmith, 1999; Park et al., 1994). Objective knowledge concerns the actual amount of *accurate information* stored in their memory (Brucks, 1985; Park et al., 1994). This distinction is important, especially when considering the source of nutrition knowledge. Mattila and Wirtz (2002) argue that subjective and objective knowledge are least likely to correspond when consumers suffer from self-deception or false expertise, as consumers can fail to distinguish between true and false experts, and therefore legitimate and illegitimate information. Also, Grunert et al. (2012) argue that both health policies and nutrition-related initiatives led by retailers and manufacturers affect how people acquire and retain knowledge about food and health, so the legitimacy of information sources can have a significant impact on consumers' baseline nutrition knowledge.

Indeed, there are significant differences between information obtained from stakeholders interested in fostering improved consumer health, and that put forward by commercial retailers

and manufacturers, as these institutions have different objectives (Nestle, 2007; Wilson, 2009). A category of foods that exemplifies this issue is functional foods, that is, fortified and enhanced foods (Heasman & Mellentin, 2001; Kleinschmidt, 2003; Lahteenmaki, 2003; Menrad, 2003; Spiteri-Cornish, 2012; Wansink, 2007). Research demonstrates that the commercially-oriented health credentials of these foods (e.g. chocolate cereal with added fiber, white bread with added omega-3, candy with added vitamins) lead many consumers to believe that such foods are healthy alternatives to high-calorie, unhealthy foods, yet this is rarely the case (Menrad, 2003; Wansink, 2007). This, in turn, may also result in a health-halo effect (Chandon & Wansink, 2007), whereby consumers overestimate the health benefits of these foods, and underestimate their calories, fat, and sugar content. This example illustrates the negative effects that the expert-lay divide (Hansen, Holm, Frewer, Robinson & Sandøe, 2003; Lidskog, 2008; Wright, Bolger & Rowe, 2002), and the expert-source bias can have on consumer dietary choices, and behaviors. Expert bias is particularly relevant to the context of this paper, as it suggests that due to “the evolving nature and pace of the information environment, evaluations of source expertise may be more fluid and open to debate than traditionally conceptualized” (Mason & Scammon, 2011, p. 215). Experts with various levels of expertise, therefore, are able to promote credibility if they use the right persuasive techniques, such as a high level of certainty when expressing their arguments (Karmarkar & Tormala, 2010). This can lead consumers to make incorrect judgments about source expertise, credibility, and legitimacy, and potentially to perceive false information to be true. Such information may then be internalized, shaping how future nutrition information is interpreted, eventually resulting in a low correlation between subjective and objective nutrition knowledge (Mattila & Wirtz, 2002), and hence leading to flawed dietary decisions.

Nutrition Literacy and the Issue of Consumer Confusion

Nutrition literacy goes beyond healthy eating knowledge, and entails the “motivation to apply nutrition information to food choices” (Block et al., 2011, p.7). Although nutrition knowledge means having nutrition-related information, nutrition literacy involves both understanding such information, and taking action on that knowledge to achieve nutrition goals and wellbeing. Block et al. (2011) suggest that nutrition literacy encompasses three elements: conceptual knowledge (i.e. reading and understanding information about food, nutrition facts, and food sources), procedural knowledge (i.e. actually using that knowledge in food shopping choices, preparation, and consumption), and the capacity, opportunity, and motivation to act on that nutrition knowledge in various food situations, and contexts (i.e. self-efficacy in food choices, preparation, and consumption).

The issue is that if consumers acquire flawed or poor conceptual knowledge – or what Brucks (1985), Park et al. (1994), and Mattila and Wirtz (2002) refer to as objective knowledge – this will also lead to poor procedural knowledge, and hence inadequate nutrition literacy. Therefore, consumers could be failing to implement healthy dietary behaviors not because they fail to respond to healthy eating communications, but rather because they do so from their level of nutrition understanding, gained through misleading or misinterpreted information sources. Flawed conceptual nutrition knowledge may be resulting in the implementation of dietary changes that go against the intentions of health messages, and this is where the consumer confusion literature can enable an enhanced understanding of such issues.

Consumer confusion has been addressed in several marketing and policy domains (Chen & Chang, 2013; DeRosia, Lee & Christensen, 2011; Kearney & Mitchell, 2001; Leek & Chansawatkit, 2006; Mitchell, Lennard, & McGoldrick, 2003; Mitchell & Papavassiliou, 1999; Walsh & Mitchell, 2010; West, Larue, Gendron & Scott, 2002), and can help frame the various

dimensions of nutrition knowledge, and literacy previously discussed. There are several consumer confusion (quasi) definitions in the extant literature, and common to all of them is the view that confusion arises out of (mis)information overload present in the decision-making environment, coupled with consumers' inability to correctly interpret the many dimensions of products or services through information processing activity (Mitchell et al., 2005; Mitchell & Papavassiliou, 1999; Turnbull, Leek & Ying, 2000). Mitchell et al. (2005) and Mitchell and Papavassiliou (1999) suggest three main kinds of confusion, namely confusion resulting from brand similarity, another emanating from information overload, and finally confusion arising from ambiguous or misleading information. The proposed antecedents of these types of confusion are similar information, excess information, and ambiguous information, respectively, with various moderators (including age, education, gender), as well as mediators (including social environment, experience, involvement). Mitchell et al. (2005) argue that those three types of confusion can lead to a number of consumer coping strategies that can steer consumers to seek positive reduction of confusion (e.g. abandoning a purchase, clarifying buying goals or seeking additional information).

Although the first type of consumer confusion (i.e. brand similarity confusion) may be less relevant to this paper's specific discussion on nutrition knowledge and literacy, the latter two types are important. Mitchell et al. (2005, p. 143) define overload confusion as "a lack of understanding caused by the consumer being confronted with an overly rich information environment that cannot be processed in the time available to fully understand, and be confident in, the purchase environment". Overload confusion can be considered relevant in the context of healthy eating, given the significant amount of pull versus push communication efforts between policy-makers and food marketers, which lead to an information-overloaded choice environment. An additional issue is that food can be a low-involvement product for some consumers in some

contexts and situations, which means that such consumers are less prone to invest much effort and time in searching for, processing, and fully understanding information in food-related, low-involvement choice contexts. Therefore, the motivation, opportunity, and ability to understand a significant amount of often competing or even incorrect healthy eating information (i.e. nutrition self-efficacy) may be limited, thus leading to poor nutrition literacy, and unhealthy food consumption. Indeed, self-efficacy (Bandura, 1993; Luszczynska, Diehl, Gutiérrez-Doña, Kuusinen & Schwarzer, 2004) often serves as a predictor of a variety of health-related behaviors, as it determines the level of effort consumers will put into achieving an outcome, and how long they will continue this effort when faced with obstacles (Warziski, Sereika, Styn, Music & Burke, 2008).

Ambiguity confusion is particularly problematic in the context of nutrition knowledge and literacy. Mitchell et al. (2005, p. 143) define such kind of confusion as “a lack of understanding during which consumers are forced to re-evaluate and revise current beliefs or assumptions about products or the purchasing environment”, and this includes confusion arising out of product complexity, ambiguous or misleading information, marketing communications, as well as false claims (e.g. functional foods). Consumers’ information and choice environments abound with ambiguous and contradictory nutrition research findings (Hornik & Kelly, 2007; U.S. Department of Health and Human Services & U.S. Department of Agriculture, 2005; U.S. Department of Agriculture [USDA], 2005; Block et al., 2011; Nestle, 2007; Pollan, 2009), as well as ambiguous information on what might constitute a healthy diet (Spiteri-Cornish 2012), or what the specific courses of action might be for consumers to achieve healthy diet goals (Beaudoin et al., 2007; Fitzgibbon et al., 2007; Snyder, 2007). Unsurprisingly, as consumers go about developing confusion-coping strategies, they may make less-than-optimum choices based on clear, but potentially illegitimate, and misleading sources of information such as poorly-

researched TV programs, and misleading commercial brand sources (Mitchell et al., 2005), as well as word-of-mouth (Walsh & Mitchell, 2010). Such sources may, in turn, offer personally appealing and convenient, but incorrect, nutrition ideas and consumption choices, leading consumers to adopt their own version of healthy eating based on their poor baseline nutrition knowledge, and personal nutrition literacy.

Thus, the primary research presented in this paper seeks to explore issues linked to baseline nutrition knowledge, consumer confusion, nutrition literacy, and why consumers might be failing to implement healthy dietary behaviors despite increased awareness of the need to eat healthily. Specifically, the aim of the research is to examine whether consumer confusion regarding nutrition information is affecting nutrition knowledge and literacy, and the potential impact of flawed nutrition literacy on consumer perceptions of healthy eating choices, and on dietary behaviors. Next, we discuss the methodology.

Method

This interpretivist study considers the subjective meanings of social action (Bryman & Bell, 2011). It provides powerful insights into consumers' nutrition knowledge and literacy, and participants' everyday meanings, discourses, and understandings of healthy eating (Riley, 1996). We believe our approach is mostly aligned with the psychology-oriented, phenomenological tradition (Stern, Thompson & Arnould, 1998; Thompson, Locander & Polio, 1989), but see knowledge as acquired through socialization processes (Riley, 1996). Phenomenological research makes the consumer's perspective the main focus of analysis, as a consumer's story has the potential to bring to the fore a plethora of information about cognitive and affective responses to marketing communications (Stern et al., 1998), as well as to public policy-driven

social marketing campaigns. According to this approach, lived experiences arise as part of situated contexts, and the meanings of such experiences make sense in light of research participants' life worlds (Thompson et al., 1989).

In light of the phenomenological and, thus, exploratory nature of this research, we deemed in-depth interviews as appropriate for data collection. Phenomenological interviews are somewhat open-ended; they provide opportunities for in-depth conversations with research participants, and allow for research accounts that acknowledge the complexities of social action to emerge (Moisander, Valtonen & Hirsto, 2009). Qualitative methods such as interviews focus on events in their natural settings, and provide detailed descriptions that are vivid, nested in real life contexts, with real impact (Miles & Huberman, 1994). Interviews also enable researchers to unearth consumer tensions, personal meanings, and conflicts, and to better recognize complex details of phenomena that are difficult to explore with other methods (Arksey & Knight, 1999; Malhotra & Birks, 2006). Further, interviews are flexible, and can enable researchers to delve deeper into the psychological impetus behind consumers' dietary behaviors (Denzin & Lincoln, 2005; Gray, 2004; Miles & Huberman, 1994).

We used a two-tiered purposive sampling technique to recruit participants (Gray, 2004; Morgan, 1997). First, we circulated an e-mail to all members of staff of a medium-sized UK university to identify consumers who were solely or mainly responsible for their family food shopping. The rationale for choosing such shoppers is that family grocery shoppers make decisions where nutrition knowledge, and literacy, may have an impact on the healthiness of the household's diet (Grunert, Fernández-Celemín, et al., 2010; Grunert, Wills, et al., 2010).

Insert Table 1 about here

Next, we emailed a participant information sheet to the 93 members of staff (70 females, 23 males) who expressed their interest in the study, and 34 individuals agreed to take part. Participants had an average of two children per household, and included 8 men, and 26 women. This predominance of female participants reflects the fact that women are significantly more likely to do grocery shopping than men (Bianchi, Sayer, Milkie & Robinson, 2012; Lachance-Grzela & Bouchard, 2010). Interviewees were aged between 24 and 58; the mean age of female participants was 34, while that of male participants was 39. Table 1 provides the demographic information for each participant, as class and other demographic factors can have an impact on consumer attitudes toward healthy eating, and their responses to health communications (Warin, Turner, Moore & Davies, 2008). We excluded staff working in our department or otherwise known to us. We asked participants to keep the shopping lists, and receipts, of four major (rather than top-up) shopping trips over a period of three months, and invited them to keep a diary detailing brief notes about the rationale behind the purchases of the food items within those four major shopping trips. The use of such open-format stimuli allowed participants to record their lived experiences with food shopping in their own words (Corti, 2003). We requested the shopping receipts a few days prior to the interviews, and analyzed them to examine participants' actual shopping behavior, that is, what foods they actually bought, rather than what they claimed to buy. This enabled us to query particular purchases, and the motivations behind such purchases, to attain insights into participants' nutrition knowledge, literacy, and dietary behaviors. Having receipts ahead of the interviews also enabled us to analyze the nutritional content of a sample of the foods purchased (i.e. calories, sugars, different types of fats, salt, additives, vitamins, and minerals, per 100g). Such information was again used during the interviews to help assess nutrition literacy as well as knowledge.

The phenomenological interviews were conducted in a local public library, and recorded with the permission of participants. Each interview lasted between one and two hours. The interviews began with a series of broad, open-ended questions to allow participants to define the initial course of the dialogue (Thompson et al., 1989). However, given the focus of this study, participants were also probed regarding food shopping behavior (e.g. How do you go about shopping for food? Do you plan ahead? Shop as you go? Can you explain how you go about *choosing* foods?). Such probes were used in an open-ended way, where appropriate, to encourage participants to explain the thought processes and affective experiences that surround the purchase of food products, and their experiences with healthy foods, healthy diets, or healthy eating. Words such as health, healthy, fattening, good for you, bad for you, five-a-day, calories, low-fat, and high fiber were loosely introduced during the interviews to enable participants to discuss their understanding and experiences of healthy eating, healthy foods, the source of their nutrition knowledge, and any attempts to have a healthy diet.

All interviews were transcribed, and each transcript ran between 8 and 20 single-spaced, typed pages. Transcripts were first read to note the main themes, and subsequently re-read, and analyzed in more depth for relevant and significant insights. Using the process suggested by King (2004), an *a priori* template informed by the extant literature was developed to guide the initial analysis. Analysis was conducted line by line, by identifying and coding themes. A small interpretive group (Thompson et al., 1989), consisting of the first author, and a research assistant, coded the data independently, and then compared their codes to ensure analytical accuracy (Pratt, 2009). Parallel coding was applied if any interview excerpt provided examples of more than one code. As the analysis progressed, new recurring codes were inserted into the developing template. Also, the analysis was iterative, and recursive: as subsequent interviews were analyzed, the amended template was re-applied to earlier interviews (Braun & Clarke, 2006). While no

template is ever final (King, 2004), saturation was assumed when new interviews did not give rise to additional themes, and when the application of the final template to all earlier interviews resulted in minimal changes (Guest, Bunce & Johnson, 2006). Interpretive quality was ensured by respecting participants' experiences and worldviews, by providing *emic* evidence to support the emerging *etic* interpretations, and by reflecting on the contributions of the research data to relevant theory (Pratt, 2009; Moraes, Michaelidou & Meneses, 2014). Next, we discuss the research findings.

Results

In this section, we examine the impact of flawed or limited nutrition knowledge on the perception of healthy foods, healthy eating, and dietary behavior. The findings highlight that consumer confusion is a relevant issue, and we discuss the main emerging themes next.

Healthy Eating Communications, and Its Impact on Consumer Awareness and Knowledge

Introductory discussions about food shopping prompted conversations about healthy eating, and the health credentials of food products. Our interviews revealed high awareness of the need to eat healthily, which was prompted by health communications. The desire to eat healthily is at the forefront of the majority of participants' minds, which is in line with the findings of previous research (Department of Health, 2009; Hawkes, 2013). However, discussions around participants' current eating patterns often resulted in feelings of guilt, shame, and fear. Admissions of guilt usually exposed health concerns, and were more prominent among participants who wanted to lose weight. Feelings of shame were more prominent in discussions with parent-participants (the majority of interviewees), who felt they should be more proactive in

encouraging their children to have healthy diets. But fear was evident across most participants, irrespective of their socio-demographic characteristics:

I'm afraid I'll get cancer or something... Well, there are a lot of these adverts now about if you eat too much you can get cancer... Every time I eat chocolate or something I'm always afraid and then I have to encourage myself to eat better so I don't get sick, you know... I know that the government wants us to eat better and that's why they do these adverts, but I think they're really frightening... I suppose in a way they do work because when I eat badly for some time I feel really scared and then I work hard to try and eat better (Felicity, 37, Researcher, Civil Partnership).

As exemplified in this quote, such fear typically stemmed from participants' diet-disease associations and their high exposure to health communications on a variety of media. Although fear can trigger motivation to change unhealthy behaviors, it can also cause consumers to avoid processing relevant healthy eating information, and to develop negative attitudes toward the desired healthy behavior (Cho & Salmon, 2008). This is why social marketers have warned policy-makers of the dangers of fear appeals in healthy eating communications (Cox & Cox, 2001; Evans & Hastings, 2009; Grier & Bryant, 2005; Hastings et al., 2004; Peattie & Peattie, 2009). But the quote also shows that, although participants try and eat healthily, relapse, rather than complete behavioral maintenance (Prochaska & DiClemente, 1983), is very common among participants. Nevertheless, it was encouraging to see that our participants, irrespective of their age, weight, gender or economic status, displayed an interest in healthy eating, and high awareness of the importance of adopting a healthy diet for improved health and wellbeing.

Participants also elaborated on how their interest in healthy eating related to their nutrition knowledge, and much of their discussions on such knowledge comprised their personal understanding of healthy eating, knowledge of nutrient content of foods, and application of

knowledge to food choices (Parmenter & Wardle, 1999; Sapp & Jensen, 1997). Indeed, our participants offered various subjective definitions of healthy eating, as illustrated in the following quote:

Eating healthy is about eating fewer calories I think, though sometimes it gets confusing... Well, I read somewhere that it's about eating less than 2000 calories per day if you want to be healthy etc. But then I figure, could I eat say, 1000 calories of chocolate and still lose weight? Well, probably not (laughter) - I wish!! Probably it's about eating fewer calories which include fruits and vegetables... Still, I do know people who eat cr** and lose weight because they don't eat a lot overall, so there's no real roadmap (Anna, 41, Administrator, Divorced).

This quote reveals one of three main ways of understanding healthy diets, namely eating everything in moderation, eating more fruits and vegetables, and eating a diet that contains all the important nutrients, all of which only partially aligned with the WHO's (2007) definition of healthy eating. During the interviews, it became clear that participants' understanding of healthy eating was distorted, and vague. For example, people whose understanding of nutrition was "*eat everything in moderation*" had doubts about whether high-calorie foods could be included in this paradigm, or whether they were expected to count calories:

I think it's not really healthy to cut foods out of your diet, you have to eat everything in moderation... You even eat junk at times and everything that you like otherwise you will not get all the nutrients you need... Well, no, I don't think they [junk food/fatty food] are good for you, so maybe you should avoid them if you can... Well, if you're trying to be really healthy then you should cut out sugar and fat, but you can still be healthy if you eat normally (Harriet, 28, Clerical Assistant, Single).

Harriet's and Anna's quotes show that people can have an overarching idea about what eating healthily means, but once that idea is considered in more depth, doubts and inconsistencies arise, which can influence dietary choices. Those that ascribed to the "eat more fruits and vegetables" model were concerned about whether this would be enough to ensure a healthier diet, whether fruits and vegetables were supposed to replace other foods, or whether eating more fruits and vegetables meant they did not need to count calories. Finally, participants who believed in the importance of "eating a diet that contains all the important nutrients" did not have an understanding of where these nutrients should be sourced from, how many nutrients were needed, and why, or whether eating nutrients should be combined with eating less calories or monitoring the levels of fat, and sugar in their diet. More importantly, participants highlighted how such healthy eating understanding had been influenced by information derived from various sources as discussed next.

Competing Sources of Nutrition Information, and Consumer Baseline Knowledge

Participants explained that they acquired their information about healthy eating not only from government health communications and food labels, but also through less reliable sources such as friends (i.e. word-of-mouth), TV programs, advertising, newspapers, public transport, and internet searches:

I'm really conscious about eating fiber, vitamins etc. I've read all kinds of stuff about how they help you live longer and not have serious sickness like cancer and liver things, you know... I don't remember where I read it, maybe online I think... I also heard it on TV adverts (Rebecca, 36, Administrator, Civil Partnership).

As illustrated in the two previous quotes, our participants revealed that they develop their understanding of healthy eating from varied sources, which, when combined, create a chaotic

view of what a healthy diet may look like. More than half of our participants explained that different sources offered them competing dietary information, which was often incomplete, contradictory, and confusing. As suggested by the extant literature, such information can be ambiguous and misleading, which, in turn, negatively impacts consumers' baseline nutrition knowledge (Grunert et al., 2012; Mattila & Wirtz, 2002). They also declared that government health communications were "absolutely terrible...they change their advice all the time, and never tell you exactly what you need to do" (John, 29, I.T. Technician, Single). This standpoint was echoed by the majority of participants in our sample, and reflects previous research suggesting that government-led, healthy eating campaigns are not specific or clear enough regarding their consumer recommendations, which significantly reduces the impact of such messages (Beaudoin et al., 2007; Henley et al., 1998; Snyder, 2007). Participants also expressed much cynicism and dissatisfaction with the advice offered by government-led information:

Well, they seem to change their mind all the time... First it's all about not eating fat, then they tell you some fats are ok, others are not. Ok, so then you have to try and figure out which fats are good, which are bad, and how much fat you can eat! Then it's sugar. So now you have to look at how much sugar the food has. Then it's fiber, so it's time to start seeing how much fiber food has... So does that mean you have to look at fat, sugar, and fiber together (Dean, 38, Senior Lecturer, Married)?

Dean expressed frustration at what he perceived as contradictory advice from official health campaigns, and this suggests that such communications might be perceived as unclear by the target population. Interestingly, participants often believe that all new research publicized through the media comes from the government, which is not always the case. This perception exacerbates the distrust that people have of the government as a source of credible, legitimate healthy eating information. Our interviews revealed that such distrust often leads participants to

look to other sources of dietary advice because information offered by the government is “so frustrating” (Harriet, 28, Clerical Assistant, Single). This resonates with previous research, which suggests that nutrition-related initiatives led by retailers and manufacturers affect how people acquire, and retain knowledge about food and health (Grunert et al., 2012). Further, our participants revealed that one of their main information sources is food adverts. Almost all participants looked to TV food adverts for nutrition information, and did not display the same antagonism about this information source as they did about government-led health campaigns:

We all know you need things like vitamin C, fiber, and calcium... I've seen it advertised, I think. Lately, for example, I've seen an advert for a type of yoghurt that has vitamin D in it, and it says that without vitamin D you cannot absorb the calcium. I didn't know that before, and now I try to find yoghurts like that... Ok, maybe if you buy fruits and vegetables you get many more nutrients, but I know that by getting these foods I get the most important ones. If I go ahead, and buy fruits and vegetables, nobody at home will eat them anyway, so now I don't buy them, and instead I buy other stuff that I know we'll all eat and have the same nutrition (Alison, 35, Departmental Secretary, Married).

The previous quote illustrates a health-halo effect (Chandon & Wansink, 2007), in which the participant overestimates the health benefits of functional food substitutes, and underestimates their unhealthy properties due to the ambivalent information communicated by commercial sources. The last quote also highlights participants' belief in the claims made by retailers, and manufacturers, about the healthiness of the functional foods they were misleadingly selling as having the same health benefits as fruits, and vegetables. These findings highlight expert source bias, as sources with various levels of expertise, and legitimacy, are able to portray credibility if they use effective persuasion techniques, such as assertiveness, when making their main arguments (Karmarkar & Tormala, 2010; Mason & Scammon, 2011). More importantly,

participants felt that the information offered by these sources was easy and convenient to follow, because their versions of healthy eating often involves food substitutions that are easier for participants to implement than the dietary overhaul suggested by health campaigns (Chakravorty, 1996; Witte, 1992), which encourage consumers to adhere to more strict healthy eating programs. This point has highly significant implications for policy-makers, because participants' liking of marketing claims, and their use of retailers and manufacturers as sources of information, frequently result in even more contradictory and flawed nutrition knowledge, which generates a spiral of confusion, and as Grunert et al. (2012) suggest, poor nutrition literacy, and thus unhealthy eating behavior.

Poor Nutrition Literacy, and Much Consumer Confusion

Most of our participants demonstrated an understanding of the nutrient content of food. Brief conversations about food nutrients were filled with terms such as fiber, anti-oxidants, omega-3, wholegrain, vitamins C, D and E, fat, saturated fat, protein, and carbohydrates. Interestingly, most of the female participants also brought up the concept of calories when discussing nutrient content, yet only a few male participants mentioned calories. The overall view about nutrients was that a diet is not healthy unless most of these nutrients are incorporated as regularly as possible. Yet, the source of these nutrients mattered only to a handful of participants. Most participants declared that as long as these nutrients are present in the diet, it should not matter from where they are sourced. It became clear that, for the majority of interviewees, the healthiness of foods in general was assessed by the presence of nutrients, which demonstrates only partial understanding of nutrition information, incorrect implementation of healthy eating knowledge, and hence poor nutrition literacy. This issue echoes previous research, which suggests that if consumers acquire flawed or poor conceptual or objective knowledge from

illegitimate sources of information, this will also lead to poor procedural knowledge, and thus inadequate nutrition literacy (Block et al., 2011; Brucks, 1985; Mattila & Wirtz, 2002; Park et al., 1994). For example, participants considered breakfast cereal with fiber to be healthier than cereal without fiber, irrespective of the calorie, fat, salt, and sugar content of such cereal. This is problematic, as it can result in people who are determined to make healthy food choices to unintentionally consume unhealthy foods instead:

Those [adverts] tell you about fiber in cereal that helps with concentration, and keeps you fuller and stuff like that... Anyway, when I go shopping I always check how much vitamins, and fiber, and things there are, you know? I mean, nowadays, even bread you can buy with this kind of stuff in it, so it makes it easy to have all the nutrients (Rebecca, 36, Administrator, Civil Partnership).

An analysis of Rebecca's diary revealed that her food choices were frequently motivated by a desire to eat more healthily, and to consume foods that contained a number of nutrients.

However, the nutrition content of these foods showed that they were high in calories, salt, fat, and sugar, and were not the healthy products the participant believed them to be. When Rebecca was presented with the nutrition content of her "healthy food choices" and asked to comment, she expressed shock and disbelief, especially when calorie content was compared unfavorably to chocolate and crisps, the calorific foods that she avoided in an attempt to eat more healthily.

Once again, this participant displayed erroneous nutrition knowledge, and like many others, obtained at least some of that information from commercial sources that do not always offer the correct type of dietary insight. Indeed, most of our participants acted on their determination to eat more healthily by engaging in food substitutions (i.e. by substituting high-calorie foods such as cakes, cookies, biscuits, and crisps for foods they perceived to be much healthier). Yet, the analysis of their food receipts indicates that, much like Rebecca, the foods most participants used

as substitutes were often as unhealthy as the ones they substituted. Further, participants' perceptions that they were consuming healthy foods meant that they also consumed more of them (Chandon & Wansink, 2007), which makes it even more difficult for participants to achieve healthy eating patterns. Therefore, the issue among our participants was not one of lack of motivation or opportunity to eat healthily, but one of poor nutrition knowledge, and poor ability to act on such knowledge in various food situations and contexts, where good food literacy is essential (Block et al., 2011).

This lack of nutrition self-efficacy (Bandura, 1993; Luszczynska et al., 2004) emanates from consumer confusion arising out of the (mis)information overload which is present in the food decision-making environment, coupled with consumers' inability to correctly interpret the many dimensions of healthy eating through information processing activity (Mitchell et al., 2005; Mitchell & Papavassiliou, 1999; Turnbull et al., 2000). Discussions with our participants uncovered that this often resulted from their desire to adopt healthy dietary patterns, combined with flawed nutrition knowledge. Indeed, findings highlight that consumer confusion arises from both information overload, and ambiguous or misleading information (Mitchell et al., 2005; Mitchell & Papavassiliou, 1999):

Sometimes they have these adverts where they tell you that you only should consider portion size, showing this boy eating a small portion of sausage and mash instead of a large one, and I think, that must have so much fat in it! So which is it? Is it fat? Calories? Portion size? Fiber? It's so confusing. How they expect anyone to get this right is beyond me (Dean, 38, Senior Lecturer, Married)!

This quote highlights that participants have come across much nutrition information, but they are confused due to the ambiguity of such information. Cases of confusion due to misleading

information, and poor nutrition knowledge, can also be found in participants' explanations of their food substitutions:

I struggle not to eat chocolate even though I know it's bad for you... And I really do want to eat healthily... I eat (brand) cereal bars instead... They're very chocolaty and I love them. I have one or two a day and it keeps the cravings away, so to speak... They're much healthier than regular chocolate bars... They're lower in calories 'cause they're cereal not actual chocolate, and they're really healthy 'cause they have fiber, so well that's two things. Plus, like I said, if I didn't eat them I would eat chocolate, and that means I'd put on weight (Tania, 32, Receptionist, Married).

After making these remarks, Tanya was shown the actual nutritional content of the cereal bar she was consuming in order to replace her favorite treat (chocolate). When it was revealed to Tanya that her cereal bars were *more* calorific than chocolate, she expressed shock, and disappointment. Much like other participants, Tanya thought that foods which are marketed as healthy (i.e. marketed as being high in fiber or having wholegrain), are also low in calories, and such perceptions appeared to be deeply ingrained in participants' minds. While none of the functional food substitutes that participants consumed had actually been marketed as being low in calories, most participants assumed they were because of the products' other health credentials. This demonstrates that attempts to eat healthily can backfire where there is ambiguity confusion (Mitchell et al., 2005), due to misleading nutrition information obtained from, in this case, manufacturers' advertising campaigns.

But Tanya's quote also shows that functional foods are examples of product complexity, with many participants erroneously believing such foods to be healthy alternatives to high-calorie unhealthy foods (Menrad, 2003; Wansink, 2007), as well as to fruits, and vegetables. The latter type of food substitution, where consumers choose functional foods over healthy

alternatives such as fish, fruits, and vegetables, has received limited attention in the extant literature. Yet, more than half of our participants claimed that they regularly engaged in this type of substitution because they disliked the taste of healthy foods. Participants firmly believed that fortified foods provided similar benefits to healthy foods:

I just don't get fruit or veg anymore nowadays or they'll just end up in the bin. I now get stuff that also has fiber and vitamins, and things like that, so we all get the nutrition we need (Alison, 35, Departmental Secretary, Married).

The foods with added nutrients described in Alison's quote included both nutritionally-rich functional foods (e.g. fortified milk, vitamin-enriched orange juice), and nutritionally-poor functional foods (e.g. high-fiber biscuits, chocolate cereal, cereal bars, and white bread with omega-3). As Alison conveys, confused nutrition knowledge about what makes a healthy diet, and the role which nutrients play in such a diet, lead to unhealthy eating choices. Thus, as participants develop their confusion-coping mechanisms, they make less-than-optimum nutrition choices based on clear, but misleading, sources of information such as commercial brand sources (Mitchell et al., 2005), and word-of-mouth (Walsh & Mitchell, 2010); sources which inspire a sense of credibility with personally appealing, convenient, but incorrect nutrition solutions, based on confusing nutrition information that generate flawed nutrition knowledge, and poor nutrition literacy.

Discussion

Much research explores the reasons why consumers might not respond to health campaigns (Verbeke, 2008; Hornik & Kelly, 2007; Fitzgibbon et al., 2007; Snyder, 2007; Peattie & Peattie, 2009; Evans & Hastings, 2009), but little is known about the various behavioral responses to

such campaigns, especially those that contravene the objectives of such communications. An understanding of how consumers respond to health communications is vital if stakeholders in health are to effectively combat the epidemic of unhealthy eating that affects most industrialized countries. This paper responds to this gap in the extant literature, and reveals that, while striving to eat healthily in their attempts to lose weight or improve wellbeing, participants consistently make unhealthy dietary choices as a result of consumer confusion, poor nutrition information derived from ambiguous sources, flawed nutrition knowledge, and hence poor nutrition literacy.

Our interviews show that consumers are likely to experience anxiety as a result of frequent exposure to healthy eating communications, and a desire to adopt healthy eating patterns (Brennan & Binney, 2010; Bublitz, Peracchio & Block, 2010; Cho & Salmon, 2006; Festinger, 1957; Henley et al., 1998). However, while health campaigns play an important role in raising awareness of the importance of healthy eating, the nutrition information that they offer is perceived by participants as inconsistent, incomplete, confusing, and contradictory across socio-demographic variables (Dallongeville et al., 2001; Grunert et al., 2012; Handu et al., 2008; Klohe-Lehman et al., 2006; Lee et al., 2009). The importance of nutrition information has been acknowledged by many researchers (Wardel et al., 2000; Worsley, 2002). Thus, this paper addresses their calls for further investigation into the link between nutrition knowledge, nutrition literacy, and food consumption (Block et al., 2011; Wardel et al., 2000; Worsley, 2002). Further, the paper examines the impact of consumer confusion (Mitchell et al., 2005), and sources of nutrition information, on nutrition knowledge and dietary behavior, which has received limited attention in the existing literature (for exceptions see for exceptions see Grunert, Fernández-Celemín, et al., 2010; Grunert, Wills, et al., 2010; Grunert et al., 2012).

The findings of this study have important theoretical implications. Participants who displayed a desire to eat more healthily expressed frustration and cynicism towards policy-led

healthy eating communications. They described such communications as contradictory, vague, and continuously shifting, which in turn led participants to seek dietary advice elsewhere. Contrary to what is discussed in the relevant literature (Grunert et al., 2010a; 2010b; 2012), this study reveals that food adverts, and information on food products themselves, are the most significant sources of nutrition information for many participants. It was clear that many of our participants learned about nutrients such as fiber, calcium, omega 3, and others, from food adverts incorporating these elements. But more relevant is the finding that interviewees accepted the information offered by commercial sources more readily than that presented by health communicators. Participants were often confused about which information came from which source, thus revealing a level of information-source misattribution (Briggs, 2006). This finding challenges research which suggests that health campaigns are essential to develop wider healthy eating adoption across the population (Beaudoin et al., 2007). On the contrary, while such communications do increase awareness of healthy eating, cynicism about such campaigns, and the competing, confusing, and inconsistent information they provide, push consumers *away* from their advice.

As suggested by previous research, healthy eating campaigns need to do more to clarify specifically what a healthy diet looks like (Hastak & Mazis, 2011; Scammon et al., 2011). Indeed, we believe that additional information will not lead to healthier eating for two main reasons. First, negative consumer attitudes towards the confusion created by dynamic changes in the guidelines provided by healthy eating campaigns must be addressed. Second, more information does not lead to better informed or knowledgeable consumers (Mitchell et al., 2005); our findings show that consumers respond to healthy eating communications, but they do so from their level of nutrition understanding, so more information will not necessarily lead to correct nutrition understanding or adequate nutrition literacy.

Manufacturers and retailers offer dietary information that is straightforward, easy for consumers to understand and implement, and which involves foods considered to be tasty. Food marketing communications rarely involve dietary overhauls. Instead, they suggest the simple substitution of foods or the addition of food products that provide valuable nutrients (Chakravorty, 1996; Witte, 1992). This means that the dietary suggestions provided by marketers are more palatable to consumers; given their appeal, consumers are more likely to rely on such commercial sources of information, as they seem to legitimize personal food preferences, and dietary habits.

Health behavior research suggests that substitutive behavior is one of the most common ways in which people respond to health communications (Chakravorty, 1996; Stok et al., 2012). This was evident in our research, which revealed two types of substitutive eating behaviors. The first involved the replacement of unhealthy foods (e.g. cakes, cookies, biscuits, crisps) with fortified counterparts that offered similar texture sensations (e.g. fiber-rich biscuits, chocolate cereal bars, fortified chocolate cereals), but were just as unhealthy as the foods participants were trying to avoid. Here, the flawed nutrition information that consumers acquired and adapted from retailers, and manufacturers, was that foods containing particular nutrients (e.g. fiber, calcium), irrespective of their calorific, fat or sugar content, were healthy foods (Block et al., 2011). Such beliefs tend to be enhanced via a health-halo effect (Chandon & Wansink, 2007), which encourages consumers to perceive foods that have healthy elements to be *healthy overall*.

The second type of substitutive behavior involved the replacement of fruits, and vegetables, by fortified foods perceived to contain the same type of nutrients. In our interviews, this stemmed from flawed nutrition information, which once again led consumers to routinely choose unhealthy (high fat, high sugar, high salt, or high calorie) foods as substitutes, failing not only to benefit from the nutritive value of fruits and vegetables, but also making their diets even

more unhealthy in the process. This latter type of food substitution has received limited attention in the literature, but seemed prevalent among our participants. This behavior evidences interviewees' poor nutrition literacy (Block et al., 2011). Participants present overload as well as ambiguity confusion (Mitchell et al., 2005), due to the significant amount of competing nutrition information available, and due to knowledge acquired from a plethora of ambiguous or misleading sources of information. This confusion results in the implementation of dietary programs that go against the intentions of healthy eating messages, and participants' own attempts to eat more healthily. Based on the previous discussion, and the use of consumer confusion concepts, our research implications can be illustrated through the framework in figure 1.

Insert Figure 1 about here

This paper presents some significant findings from a policy perspective. It is not enough for health campaigns to increase awareness of healthy eating. Policy-makers must strive to become the most credible sources of information about healthy eating, and must distinguish themselves from competing sources of information. They must attempt to counteract negative attitudes resultant from inconsistent, contradictory, and confusing information presented over the years, and offer straight forward dietary advice that consumers can understand, and readily adopt; practical advice which resonates with today's convenience food culture, and consumers' hectic lifestyles. It is essential for health campaigns to consider consumers' proclivity for using substitutive behavior as a way of changing their eating habits, and offer practical as well as relevant information about positive substitutions.

Overall, policy-makers must understand that consumers require clear, unambiguous information about what healthy eating means, what healthy foods are, and what a healthy diet

looks like, and must develop an intervention program that addresses such issues directly. Finally, health policy-makers need to work closely with companies that market functional foods to encourage them to develop clear marketing communications, to ensure that consumers gain an appropriate understanding of the nature of functional foods, and the role that such foods can play in their dietary behaviors. Policy-makers must also enable consumers to distinguish between the different categories of functional foods, and empower them to make positive dietary choices through improved nutrition literacy.

Conclusion

This paper draws on the consumer confusion literature (Mitchell et al., 2005; Mitchell & Papavassiliou, 1999), and examines issues linked to health communications, nutrition knowledge, and healthy eating behavior. Interpretive findings suggest that consumer confusion regarding nutrition information is indeed affecting nutrition knowledge, and literacy, which in turn is impacting consumer perceptions of healthy foods, and consequent dietary behaviors. The first main contribution of the paper is its ability to highlight that it is not that consumers are not responding to healthy eating communications, but rather that they are responding based on their flawed nutrition knowledge, and literacy. It is argued that consumer attempts to eat healthily can backfire due to overload, and ambiguity confusion (Mitchell et al., 2005). Findings demonstrate that consumers are likely to acquire their nutrition information from a variety of sources, many of which are unreliable.

Another contribution of the paper is its suggestion that nutrition information, and knowledge, are not sufficient to drive healthy eating. Instead, consumers need appropriate nutrition literacy including correct information (i.e. legitimate knowledge derived from health

communicators' information), the capacity to interpret such information (i.e. nutrition self-efficacy), and the opportunity as well as motivation to apply correct nutrition knowledge in several contexts, and situations (Block et al., 2011). As a result, a range of original policy implications are outlined, including the need for policy-makers to help consumers understand the nature, and use of functional foods in their dietary plans.

A third contribution of the paper is its use of consumer confusion concepts in the context of nutrition knowledge, and nutrition literacy, and the outlining of a consumer confusion framework for healthy eating. The framework conceptualizes the intricate relationships between consumer confusion, flawed nutrition knowledge, and poor nutrition literacy, and we hope it will inspire future studies in this area of research.

Research limitations include the exploratory nature of the study, so we recommend that it be followed by further empirical research. As is the case with much qualitative work, the sample size of this research is relatively small, so future studies should use large, representative samples of specific consumer populations. Second, the sample was relatively homogenous in that it involved people from the same geographical area, who work for the same institution. While participants held jobs that reflected different socio-economic statuses, and displayed different cultures and demographic characteristics, future research could use heterogeneous samples for the purpose of generalization (Gray, 2004). Also, there is always the possibility of social-desirability bias in qualitative research (Payne & Williams, 2005; Payne & Payne, 2004). While receipts and diaries were to some extent used to counteract this bias, we acknowledge this as a potential limitation of our research. Future studies can use methodologies such as experimental designs, which allow for causality to be established with more objectivity. Overall, while our findings cannot be generalized to the entire UK population, they provide valuable insights that can be used by policy-makers, and academics alike, in order to further their understanding of

healthy eating campaigns, consumer confusion, nutrition knowledge and literacy, and healthy eating behavior.

Further, it would be beneficial to analyze whether there are any links between consumer socio-psychographic characteristics, and the way consumers acquire, and apply, their nutrition information. It would also be valuable for future research to consider the role of nutrition self-efficacy in how consumers obtain their nutrition knowledge, and how they interpret such knowledge. We suggest an investigation into whether consumers with lower perceived self-efficacy are more likely to choose nutrition sources that offer them easy solutions to their dietary problems. As such, this construct should be included in future quantitative studies about nutrition knowledge, confusion, and healthy eating behavior.

Finally, we recommend further investigation into the psychology of functional foods consumption, which again should be explored alongside self-efficacy theories. Such foods appear to be in the market to stay, so policy-makers need to gain a better understanding of how and why such foods are consumed if they are to offer appropriate rather than confusing information about healthy eating to consumers.

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Table 1. Participants' Profiles

Pseudonym	Age	Gender	Nationality	Job Title	Marital Status	Child	Fresh, Frozen or Canned Fruits and Vegetables Purchased (for duration of study)
Emma	27	F	Brit. Asian	Associate lecturer	Married	1	4 fruit items/ 2 veg.
Adam	40	M	English	Handyman	Married	3	3 fruit items/ 1 vegetable item
Rebecca	36	F	English	Administrator	C. Partnership ¹	2	2 fruit items
Tania	32	F	English	Receptionist	Married	2	2 fruit items/ 3 veg
Nina	42	F	British	Web Developer	Divorced	1	1 fruit item/ 5 veg
Emily	32	F	Brit. Black	Lecturer	Married	0	2 fruit items
Mandy	46	F	English	Administrator	Married	2	3 fruit items/ 3 vegetable items
Sam	29	M	Welsh	Lecturer	C. Partnership	0	3 fruit items/ 4 vegetable items
Betty	30	F	English	Teaching Assistant	C. Partnership	2	2 vegetable items
Alison	35	F	Scottish	Departmental Secretary	Married	1	3 fruit items/ 6 vegs
Mary	25	F	English	Receptionist	Single	0	6 fruit items
Diane	45	F	Brit. Asian	Principal Lecturer	Married	3	4 fruit items/8 veg
Elena	41	F	English	Cleaning Supervisor	Married	2	3 vegetable items
John	29	M	English	I.T. technician	Single	1	4 vegetable items
Angie	50	F	Brit. Black	Financial Officer	Married	3	1 fruit item/ 1 veg
Simone	28	F	English	Administrative Assistant	C. Partnership	2	2 fruit items/5 veg
Lucy	62	F	English	Administrative Officer	Married	4	1 fruit item
Gina	32	F	English	Lecturer	Married	4	4 fruit items
Sarah	34	F	Scottish	Senior Lecturer	Married	1	2 vegetable items
Cindy	35	F	English	Secretary	Divorced	0	1 fruit item/ 3 veg
Cara	41	F	English	I.T. specialist	Divorced	3	3 fruit items/ 1 veg
Bridget	46	F	Brit. Asian	Research Assistant	Married	1	3 fruit items
Belle	28	F	English	Lecturer	C. Partnership	2	2 fruit items/6 veg
Stefan	31	M	English	Lecturer	C. Partnership	0	4 vegetable items
Anna	41	F	Brit. Black	Administrator	Divorced	1	1 fruit item
Rachel	49	F	Welsh	Researcher	Married	1	2 fruit items/ 2 veg
Dean	38	M	English	Senior Lecturer	Married	2	1 fruit item/ 3 veg
Felicity	37	F	English	Researcher	C. Partnership	2	8 vegetable items
Harriet	28	F	English	Clerical Assistant	Single	1	6 vegetable items
Jane	60	F	English	Deputy Dean	Widowed	2	4 fruit items/ 9 veg
Lisa	57	F	English	Lecturer	Married	3	5 vegetable items
Mona	24	F	English	Cleaner	Single	0	3 fruit items
Oprah	34	F	English	Senior Lecturer	Single	0	9 vegetable items
Wendy	45	F	English	Principal Lecturer	Married	3	1 fruit item/ 2 veg

¹ Civil partnership

Figure 1: A Consumer Confusion Framework for Healthy Eating

